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Social Disconnection and Burnout: Relevant Variables for Online Learning

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Abstract. *This study explores the role played by social disconnection, burnout, and other study variables related to the use of information and communication technologies (ICT) in university students' learning. It was carried out in the context of the mandated shift to an online modality during the COVID-19 pandemic. The sample consisted of 330 participants enrolled in the Spanish educational system. Descriptive univariate statistics were obtained, and Spearman correlations and linear multiple regressions were calculated. Significant correlations were found between online learning and all the other variables in the study. The multiple linear regression model showed that higher degrees of perceived online learning were predicted by higher Academic Efficacy, lower perceived social disconnection from classmates, greater use of cameras by classmates during online classes, and more availability of adequate space at home for learning activities. This study provides support to some of the findings already established in the literature (e.g., the relation between burnout and learning), and it also offers new evidence with regard to some aspects that have received less attention in previous research, such as the role of social disconnection from classmates and certain ICT-specific variables.*

Keywords: *learning; social disconnection; ICT; burnout; online teaching*

Desconexión social y burnout: variables relevantes en el aprendizaje en línea

Resumen. *Este estudio exploró el papel de la desconexión social, el burnout y otras variables relacionadas con el uso de las tecnologías de la información y la comunicación (TIC) en el aprendizaje de los estudiantes universitarios. Se llevó a cabo en el contexto de la modalidad online derivada de la pandemia del COVID-19. La muestra estuvo compuesta por 330 participantes matriculados en el sistema educativo español. Se obtuvieron estadísticos descriptivos univariantes y se calcularon correlaciones de Spearman y regresiones lineales múltiples. El aprendizaje en línea correlacionó significativamente con todas las demás variables. El modelo de regresión lineal múltiple mostró que una mayor eficacia académica, una baja desconexión social percibida con respecto a los compañeros de clase, un mayor uso de la cámara por parte de los compañeros durante las clases en línea y una alta disponibilidad de un espacio adecuado en el hogar para las actividades de aprendizaje fueron variables que predijeron un mayor aprendizaje en línea. Este estudio respalda algunos hallazgos ya establecidos en la literatura (por ejemplo, la relación entre el burnout y el aprendizaje) y también genera nuevas evidencias sobre algunos aspectos menos estudiados en investigaciones previas, como el papel de la desconexión social de los compañeros de clase y algunas variables específicas asociadas a las TIC.*

Palabras clave: *aprendizaje; burnout; desconexión social; enseñanza en línea; TIC.*

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Information and communication technologies (ICT) allow for a form of distance learning that has been adopted in different contexts in recent years. The European Higher Education Area has long advocated the integration of ICT into higher education in response to the demands of the knowledge society (López-Navas, 2014). In some instances, ICT may constitute the only teaching tool, as occurred during the first stages of the COVID-19 pandemic, when virtual classes became a public health obligation in many countries and universities had to adapt to new study conditions, using videoconferences, collaborative tools, etc. (Bautista et al., 2020; Dzib Moo, 2020). These educational changes posed new challenges to lecturers and students. Some of the most evident challenges were uneven access to technical infrastructure and online competencies, as well as the pedagogical difficulties associated with distance learning (García-Peñalvo et al., 2020). Indeed, students might not have had access to an adequate study area at home or the necessary tools (Baticulon et al., 2021), such as computers or tablets, which previous research has shown to be the devices most used by university students to carry out academic tasks (Monroy García & Fialho, 2023).

School and university closures due to COVID-19 affected both learning and examinations (Schleicher, 2020). Specifically, students showed a marked decrease in their performance (Meo et al., 2020), reporting poorer learning outcomes and more difficulties in achieving the course objectives (Urzúa et al., 2020). Thus, it is essential to study the extent to which the school and university closures impacted students' learning. The present study seeks to explore the relationship of the challenges posed by COVID-19, and the resulting adaptations made by universities, with students' learning perceptions.

Students' active engagement is considered central to their academic success (Docherty et al., 2018). School relationships constitute the main ingredient for active engagement and thus for learning (Lam, 2005). Collective learning opportunities have a definite impact on students' progress (Lam, 2005) and the interaction between the teacher, the learner, and the subject matter has indeed been found to mediate all learning (Raider-Roth, 2012). Rodgers and Raider-Roth (2006) underline the importance of *presence* in creating genuine learning experiences. This presence involves paying attention to the fundamentals of classroom life, including the teacher-student relationship and relationships among peers. Social presence, defined as the ability to perceive others (Xia et al., 2024), has consistently been linked to positive academic outcomes. Research has shown that higher perceived social presence (including peer presence) correlates with better academic performance and greater satisfaction and perceived learning (Lim, 2023; Richardson & Swan, 2003; Yang et al., 2016; Xia et al., 2024). It also fosters trust, engagement, and collaboration among peers (Vrieling-Teunter et al., 2022). A meta-analysis along these lines confirmed that social presence, because it promotes a sense of belonging and connectedness, has a measurable association with perceived learning and satisfaction (Martin et al., 2022). Altogether, these findings underscore the essential role of peer interactions and social connectedness in sustaining students' engagement in online and blended learning environments.

The main adaptation made by universities during the COVID-19 pandemic involved the abrupt change to online learning, which may have drastically decreased this presence during the COVID-19 period, therefore disturbing the typical learning process. Previous studies have shown that online education often demands tasks that involve little human interaction and can thus increase students' social disconnection from peers and lecturers (López-Campuzano & Estrada-Orrego, 2022). Indeed, during COVID-19 lockdowns, students reported that not being able to see other peers and lecturers made them feel emotionally detached from friends and fellow students (Hill & Fitzgerald, 2020; Meo et al., 2020). Social disconnection can have marked detrimental consequences for learning, including a loss of trust in oneself and one's teachers and peers, which can hinder the construction of knowledge (Raider-Roth, 2005). However, no studies have examined the impact of this social disconnection on students' learning in the complex educational context of the COVID-19 pandemic. Addressing this gap in the literature will increase our understanding of the role that social disconnection and other related variables can play in learning. This knowledge could be useful in efforts to improve the learning experience in similar contexts where social disconnection is a key element, such as distance or online learning, or in situations where changes from face-to-face education to online learning are necessary.

Another key element for student engagement is technology. Technology made the move to online education possible during an exceptional worldwide health crisis, and this change was accomplished in record time. Even before the COVID-19 pandemic, ICT had become a valuable resource in the teaching-learning process (Rivero Cárdenas et al., 2013), facilitating new social virtual spaces that allowed new teaching and learning processes (Chávez et al., 2021). For example, synchronous online systems offered different communication modes which increased the level of social interaction among students over that of asynchronous online systems (McBrien et al., 2009), demonstrating the close link between ICT and the aforementioned *social presence*. Social presence is indeed positively predicted by students' online interactions (Horzum, 2017), as students who engage in online collaborative interactions are more likely to perceive a connection to their classmates (Sleeman et al., 2019). In this sense, camera use during videoconferences has been linked to greater levels of trust and rapport among students, since they are able to per-

ceive more verbal and nonverbal cues (Sederevičiūtė-Pačiauskienė et al., 2022). Nevertheless, students' perception of ICT changed in recent years: before the COVID-19 pandemic, ICT use represented a differentiating element in the context of mostly face-to-face classes, offering variety and helping to increase student motivation and engagement. However, following the COVID-19 outbreak, as ICT became the only educational tool, the variety, enjoyment, and motivation that students got out of these tools significantly decreased (López-Campuzano & Estrada-Orrego, 2022), thus reducing students' engagement in learning.

Introducing ICT in the educational domain modifies the traditional relationships between teachers and students (López-Campuzano & Estrada-Orrego, 2022), and, as such, there is a need for a model that is able to account for various communication processes within ICT-mediated educational interactions. Garrison et al. (1999) explored computer-mediated communication (CMC) in higher education, emphasizing three essential "presences" as conditions for knowledge construction in virtual teaching-learning environments. The first is cognitive presence, pivotal for success in higher education, as it determines the extent to which learners can construct meaning through sustained communication (Kanuka & Garrison, 2004). The second core element of the model is the above-mentioned social presence, meaning the degree to which participants are able to project themselves as "real" people, fostering communication, creating attachment, and building group cohesion to establish a sense of belonging to the learning community. The third is teaching presence, which relates to curriculum and organizational design. Meaningful learning processes are more likely when these three *presences* all coincide (Garrison et al., 1999). As previously noted, research suggests that social presence was especially diminished during the COVID-19 pandemic (Hill & Fitzgerald, 2020; Meo et al., 2020), likely impacting students' learning.

Another factor that has often been found to be related to lesser active engagement and reduced learning is burnout (Schaufeli, Martínez, et al., 2002; Schaufeli, Salanova, et al., 2002; Sveinsdóttir et al., 2021). Student burnout is characterized by three dimensions: Emotional Exhaustion (feeling fatigued because of a high workload or other reasons), Cynicism (a distant or indifferent attitude toward one's studies and their potential usefulness), and low Academic Efficacy (a feeling of incompetence concerning one's studies; Schaufeli, Martínez, et al., 2002, Kachel et al., 2020). Research has shown that lower levels of the latter dimension, Academic Efficacy, are indeed related to poorer academic performance (Caprara et al., 2008). During the COVID-19 lockdown, students felt confused and unsure of how to proceed, rarely seeking clarification from lecturers due to the absence of face-to-face interaction (Hill & Fitzgerald, 2020), tendencies which probably translated into reduced Academic Efficacy. Moreover, social disconnection has emerged as a major factor contributing to university students' burnout (Shapiro et al., 2015; Freedy et al., 2022), while the perception of support in their studies has been linked to lesser degrees of Emotional Exhaustion and Cynicism and greater feelings of personal accomplishment and satisfaction (Au et al., 2018). Therefore, the social disconnection created by the COVID-19 online learning context might have increased student burnout. Conversely, by fostering belonging and support, social presence can increase Academic Self-efficacy (Xia et al., 2024) and predict learning satisfaction, engagement and better outcomes (Shehzad & Charles, 2023; Xia et al., 2024).

In conclusion, the context of the COVID-19 pandemic generated very high levels of social disconnection, and the relationship of this lack of connections with learning requires more in-depth study. In this sense, it is necessary to examine how certain variables may affect both learning and social disconnection. This study explored the role that social disconnection and other related variables played in university students' learning during the period of mandatory online teaching imposed by the COVID-19 pandemic. Specifically, it sought to determine the extent to which perceived online learning was explained by social disconnection, burnout, and several online learning-related variables (i.e., availability of a computer or tablet, availability of adequate space for learning activities, and camera use and participation during online classes). The hypotheses were as follows:

H1: Perceived learning during the COVID-19 pandemic will show a negative correlation with social disconnection.

H2: Greater availability of an adequate study space and access to the necessary device (computer or tablet) will be associated with higher perceived learning.

H3: Higher levels of students' and their peers' active participation in online classes will be associated with lower degrees of social disconnection and higher levels of perceived learning

H4: Greater camera use by students and peers during online classes will be associated with lower social disconnection and higher perceived learning.

H5: Higher social disconnection will be associated with higher burnout.

H6: Higher burnout will be associated with lower perceived learning.

Methods

Participants

The sample was made up of 330 Spanish-speaking students enrolled in Spanish universities. The mean age was 24.31 (*SD* = 7.50, range 18-56). Most were women (77.9%), 21.2% were men, and 3 people (0.9%) identified as non-binary. During the 2020 lockdown, 89.1% were undergraduate students and 10.9% were graduate students (i.e., enrolled in a master's or Ph.D. program).

Instruments

Sociodemographic data. Participants reported their gender and age, as well as the educational level in which they were enrolled during the 2019-2020 academic year.

Perceived online learning. This construct was measured *ad hoc* with eight items rated on a four-point Likert-type scale, ranging from 1 (*Totally disagree*) to 4 (*Totally agree*). These items were developed following a literature review and were designed to assess the participants' perception of learning during the COVID-19 lockdown. The items were the following:

1. I feel that I learned more content through online learning than under normal conditions before COVID.
2. I have developed skills or academic competencies that I had not developed before.
3. I was provided with enough material to support my online learning.
4. During the lockdown, I was motivated to maintain my learning through virtual platforms and media.
5. I managed my time well in my online learning.
6. When studying/working online, I believe that I was distracted by other online activities (e.g., messages, browsing the Internet, social networks…).
7. I felt confident in the knowledge and skills I needed to manage online learning tools.
8. I believe the shift to online learning was a positive experience.

The scores on the items demonstrated good internal consistency ($\alpha = .81$), and the total score was obtained by summing the item responses.

Maslach Burnout Inventory-Student Survey (MBI-SS; Schaufeli, Martínez, et al., 2002). This inventory has 15 items answered on a Likert-type response scale from 0 (*Never*) to 6 (*Every day*). It assesses the three components of academic burnout: higher scores for Exhaustion and Cynicism and lower scores for Academic Efficacy indicate higher levels of burnout. Previous research has reported evidence of validity for the scale's scores (Schaufeli, Martínez, et al., 2002), and it also showed good internal consistency in this study ($\alpha = .89$ for Exhaustion, .88 for Cynicism, and .82 for Academic Efficacy).

Social disconnection from peers. Participants rated their feelings of social disconnection from classmates during the lockdown period (the item was: "Evaluate to what extent you felt disconnected from your classmates during the lockdown") on a 4-point Likert scale (from *Never* to *Very frequently*).

Study-related variables. Participants reported the availability of adequate study space and a computer or tablet during the lockdown, and they indicated the degree to which they and their classmates had participated in online class discussions through videoconferences and used their computers' cameras during online classes.

Procedure

This cross-sectional study was approved by the ethics committee at the authors' university (reference RGI 2020_01GW_05_21). A link to an online questionnaire was distributed via institutional email, academic platforms, and other formal social networks. Participants read and agreed to an informed consent form, and they did not receive any compensation.

Data Analysis

Descriptive univariate statistics were obtained for the sociodemographic variables. Spearman's correlations were calculated to test the bivariate relations between the study variables, as most of them were ordinal. Variables correlated with online learning at $p < .05$ were subsequently entered into a multiple linear regression model, testing for multicollinearity between the predictors (VIF and tolerance values, respectively, > 2.5 and < .40; Allison, 1999). As there were slight problems with the variable measuring participants' own camera use (VIF = 2.51 and tolerance = .40), it was excluded from the analysis. Residuals were examined for non-normality, heteroscedasticity, and influential outliers; none seemed problematic. All significant levels reported are two-sided. Analyses were performed in SPSS (version 27).

Results

Bivariate associations

Table 1 shows the correlations between the study variables. Correlations between perceived online learning and other variables were all significant, with absolute values ranging from .13 to .37. The strongest correlations were with social disconnection from peers, Emotional Exhaustion and Cynicism (negative correlations), and with Academic Efficacy (positive correlation). Moreover, social disconnection from peers was weakly-moderately associated with lower availability of adequate study space and lower levels of one's own and one's classmates' participation in virtual classes. Greater availability of adequate study space was also related to greater availability of a computer or tablet as well as to higher rates of one's own participation. Finally, there were moderate-strong, positive associations among own and classmates' participation and camera use.

Multiple linear regression analysis

The multiple linear regression model adopted perceived online learning as the criterion variable and the variables significantly associated with it in the bivariate analyses as predictors (camera use was excluded; see data analysis section). A significant regression equation was found ($F[9.266] = 16.46$, $p < .001$; adjusted $R^2 = .34$). Several variables were not significant predictors: students' own class participation ($t = .81$, $p = .42$), classmates' participation ($t = -.38$, $p = .71$), availability of computer or tablet ($t = 1.20$, $p = .23$), Emotional Exhaustion ($t = -1.48$, $p = .14$), and Cynicism ($t = .52$,

Table 1. Spearman's Correlations Among Online Learning and Other Study-Related Variables

	1	2	3	4	5	6	7	8	9	10
1. Online learning										
2. Adequate space	.24***									
3. Computer or tablet	.13*	.20***								
4. Own participation	.29***	.21***	.07							
5. Classmates' participation	.18**	.13*	.09	.52***						
6. Own camera use	.23***	.03	-.02	.46***	.27***					
7. Classmates' camera use	.25***	.00	-.02	.28***	.34***	.70***				
8. Social disconnection from peers	-.37***	-.16**	-.01	-.19**	-.21***	-.06	-.11			
9. Emotional exhaustion	-.31***	-.22***	-.02	-.24***	-.04	-.13*	-.09	.15**		
10. Cynicism	-.31***	-.27***	.04	-.24***	-.09	-.16**	-.13*	.18***	.65***	
11. Academic efficacy	.36***	.14*	.01	.32***	.03	.15*	.02	-.11	-.41***	-.51***

Note. The table shows Spearman's correlations among measures.
*** $p < .001$. ** $p < .01$. * $p < .05$.

Table 2. Multiple Linear Regression of Online Learning

	Unstandardized coefficients		Standardized coefficients
	B	S.E.	β
Classmates' camera use	1.20	.29	.21***
Social disconnection from peers	-1.83	.29	-.32***
Availability of adequate space for learning activities	.71	.24	.15**
Academic efficacy	.24	.04	.33***

Note. Only the significant coefficients are included in this final model. $N = 276$. S.E. = Standard Error.
*** $p < .001$. ** $p = .004$.

$p = .60$). The regression model was calculated again without these variables ($F[4.271] = 35.83$, $p < .001$, adjusted $R^2 = .34$). Higher degrees of online learning were predicted by higher Academic Efficacy, lower social disconnection from peers, more use of cameras by classmates, and greater availability of adequate study space. Table 2 shows detailed results.

Discussion

This study reported the associations between perceived online learning and social disconnection from peers, burnout, availability of a computer or tablet, availability of an adequate study space, and participation and camera use during online classes.

Firstly, greater levels of social disconnection from peers were linked to lower levels of participation in virtual classes by students themselves and their classmates, a finding that echoes previous research (Sleeman et al., 2019). However, no association emerged with camera use (their own or their classmates'). This is contrary to previous studies (Sederevičiūtė-Pačiauskienė et al., 2022) but in line with research suggesting that ICT cease to contribute to students' engagement when they become the only educational tool (López-Campuzano & Estrada-Orrego, 2022). Meanwhile, higher levels of burnout were reported by those who did not have adequate study space, participated less during virtual classes, and used their camera less often. Moreover, social disconnection from peers showed a positive relationship with Emotional Exhaustion and Cynicism, two dimensions of burnout, in line with previous studies reporting that the lack of social connectedness and loneliness is a major contributing factor (Au et al., 2018; Shapiro et al., 2015; Freedy et al., 2022).

Perceived online learning was significantly related to all the studied variables. A moderate, negative association emerged with social disconnection from peers, as previous studies have also suggested (Meo et al., 2020; Raider-Roth, 2005; Urzúa et al., 2020). This highlights the relevant role of relationships in learning (Garrison et al., 1999; Raider-Roth et al., 2012) and underscores the need to improve communication and group cohesion in virtual learning environments to enable a sense of belonging to the learning community.

Moreover, perceived online learning showed significant moderate correlations with burnout, also consistent with previous studies indicating how burnout negatively impacts learning (Caprara et al., 2008; Schaufeli, Martínez, et al., 2002; Sveinsdóttir et al., 2021). Additionally, greater online learning was reported by those who had better access to a computer or tablet and to an adequate study space, a finding in accordance with previous research highlighting the obstacle to online learning represented by a lack of this access (Baticulon et al., 2021). Higher perceived online learning was also found among those reporting high levels of participation (both their own and their classmates', which can be linked to lower social disconnection from peers; Sleeman et al., 2019) and more frequent camera use (their own and their classmates') during virtual classes. While lesser camera use had been previously associated with higher social disconnection from peers (Sederevičiūtė-Pačiauskienė et al., 2022; a result not found in this study, as discussed), no prior research had linked camera use to perceived online learning. Future studies should explore this avenue and seek to replicate these findings. Finally, a multiple linear regression demonstrated that four variables were able to significantly predict 34% of the variability in perceived online learning while accounting for the associations between the predictors. These four variables were the burnout dimension of Academic Efficacy, social disconnection from peers, classmates' camera use, and availability of adequate study space.

This study provided support to some findings already established in the literature (e.g., the relation between burnout and learning), but it also explored aspects less studied in previous research, such as the role of social disconnection from peers and some ICT-specific variables (e.g., camera use, participation in online classes). Notably, while camera use was not linked to social disconnection from peers, it was related to burnout and online learning, something not explored in previous research and meriting further attention. Moreover, our results add to the notion that the unavailability of adequate study space might be an obstacle that not only prevents learning but also increases burnout. Finally, more than a third of the variability in perceived online learning can be predicted by four variables, which point to some aspects worth considering in both future research and teaching practice.

Nonetheless, some limitations of the study must be considered. As more than half of the participants were recruited from the first author's university through a convenience sampling method, the results should be interpreted with caution. To enhance generalizability, future studies should replicate these findings with larger and more diverse nationwide samples that ensure greater representativeness. The use of self-report measures could also lead to biases in participant responses, so future studies should include objective measures whenever possible. Moreover, perceived online learning was assessed using an *ad hoc* measure that demonstrated good reliability in this study but has not yet been extensively validated. Similarly, social disconnection from peers was evaluated with a single *ad hoc* item. Therefore, the results should be interpreted with caution. In addition, some potentially confounding variables (e.g., prior experience with online learning, the emotional state of the students, access barriers to access to leisure activities, the use of different social networks, the use of cooperative methodologies) were not considered in this study. Future studies should include these and other relevant variables to better isolate the effects of social disconnection and burnout on perceived learning. Lastly, due to this study's correlational nature, causality cannot be established, so experimental and longitudinal designs should seek to replicate our results.

Several practical implications can be drawn from the reported findings. First, to foster students' academic efficacy, special emphasis should be placed on designing effective learning activities. Within these activities, students should be encouraged to seek clarification when needed (Hill & Fitzgerald, 2020). Second, having an adequate study space at home is essential. This is particularly important in emergency situations such as the COVID-19 lockdowns, when access to libraries and other study spaces was limited. Finally, promoting social connectedness among classmates is crucial to sustain engagement, particularly when ICT are the only learning tools. Lecturers and other facilitators should encourage participation and camera use in virtual classes to enhance a sense of closeness, prevent burnout, and support learning.

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Declaration of interest

The authors report that there are no competing interests to declare.

Data availability

The data that support the findings of this study are available from the corresponding author, CC, upon reasonable request.

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